FIG. 1

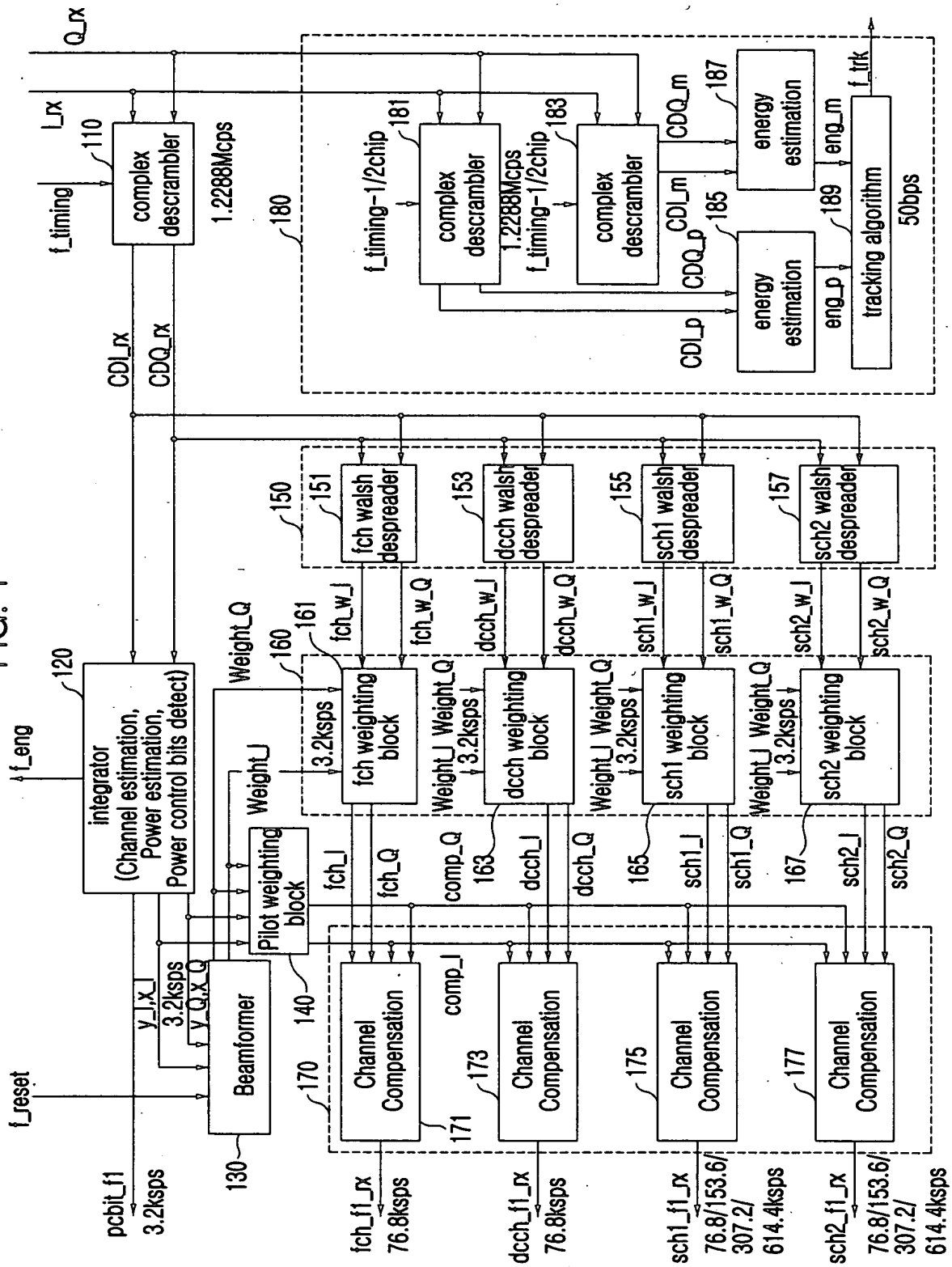

I_rx
Q_rx
f_timing
110
complex descrambler
1.2288Mcps
180
CDI_rx
CDQ_rx
f_timing-1/2chip
181
complex descrambler
1.2288Mcps
f_timing-1/2chip
183
complex descrambler
CDQ_m
CDI_m
187
energy estimation
eng_m
f_trk
CDQ_p
CDI_p
185
energy estimation
eng_p
189
tracking algorithm
50bps
150
151
fch walsh despreader
153
dcch walsh despreader
155
sch1 walsh despreader
157
sch2 walsh despreader
fch_w_I
fch_w_Q
dcch_w_I
dcch_w_Q
sch1_w_I
sch1_w_Q
sch2_w_I
sch2_w_Q
120
integrator (Channel estimation, Power estimation, Power control bits detect)
f_eng
Weight_Q
160
161
Weight_I
3.2ksps
fch weighting block
Weight_I Weight_Q 3.2ksps
dcch weighting block
Weight_I Weight_Q 3.2ksps
sch1 weighting block
Weight_I Weight_Q 3.2ksps
sch2 weighting block
Pilot weighting block
fch_I
fch_Q
comp_Q
163
dcch_I
dcch_Q
165
sch1_I
sch1_Q
167
sch2_I
sch2_Q
y_I,x_I
3.2ksps
y_Q,x_Q
Beamformer
140
comp_I
170
Channel Compensation
171
173
Channel Compensation
175
Channel Compensation
177
Channel Compensation
f_reset
130
pcbit_f1
3.2ksps
fch_f1_rx
76.8ksps
dcch_f1_rx
76.8ksps
sch1_f1_rx
76.8/153.6/ 307.2/ 614.4ksps
sch2_f1_rx
76.8/153.6/ 307.2/ 614.4ksps

FIG. 2A

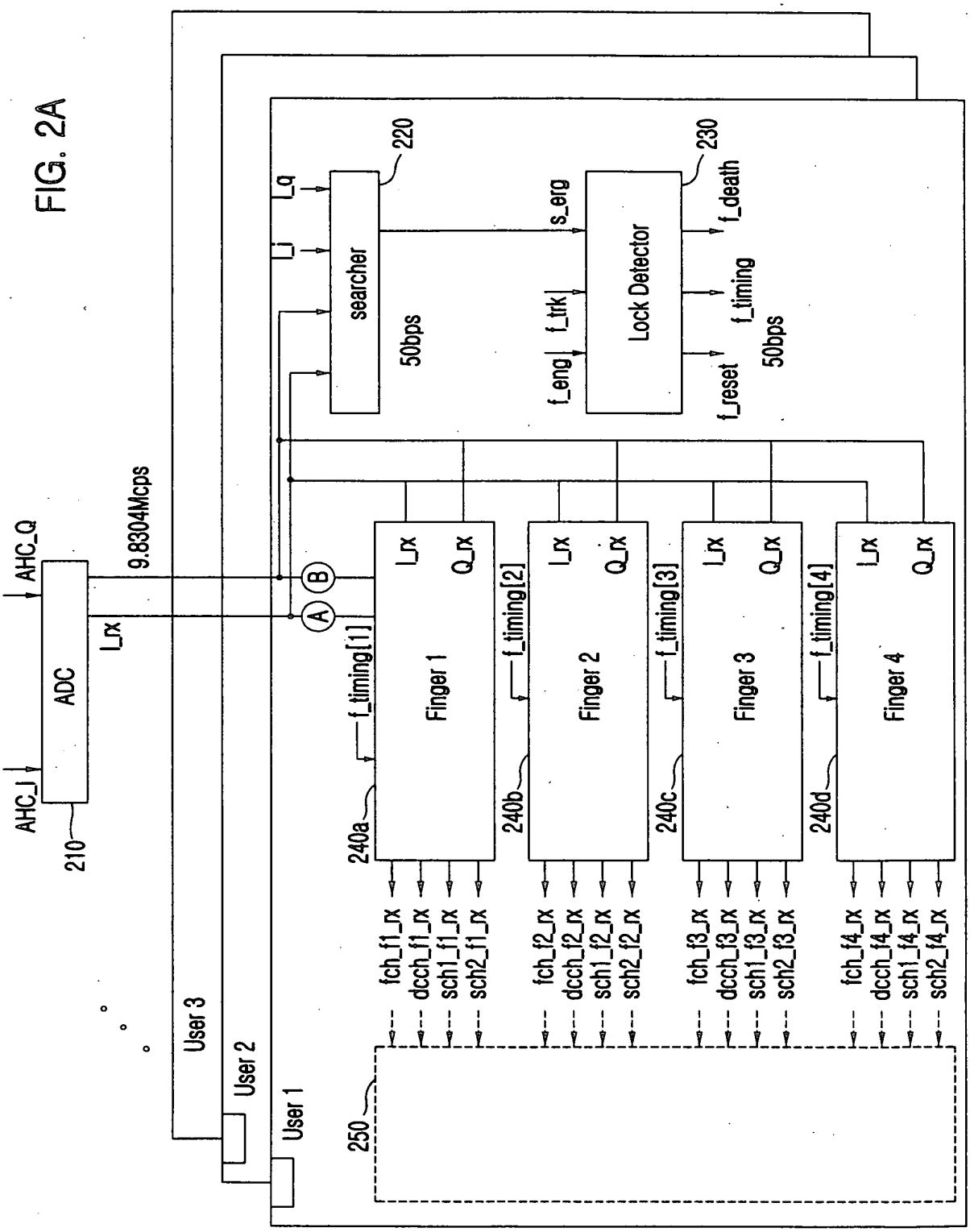

User 3
User 2
User 1
250
searcher
220
50bps
Lock Detector
230
f_death
f_timing
50bps
f_reset
f_eng
f_trk
s_erg
Lj
Lq
ADC
210
AHC_I
AHC_Q
Lrx
9.8304Mcps
A
B
f_timing[1]
f_timing[2]
f_timing[3]
f_timing[4]
Finger 1
Finger 2
Finger 3
Finger 4
240a
240b
240c
240d
Irx
Qrx
fch_f1_rx
dcch_f1_rx
sch1_f1_rx
sch2_f1_rx
fch_f2_rx
dcch_f2_rx
sch1_f2_rx
sch2_f2_rx
fch_f3_rx
dcch_f3_rx
sch1_f3_rx
sch2_f3_rx
fch_f4_rx
dcch_f4_rx
sch1_f4_rx
sch2_f4_rx

FIG. 2B

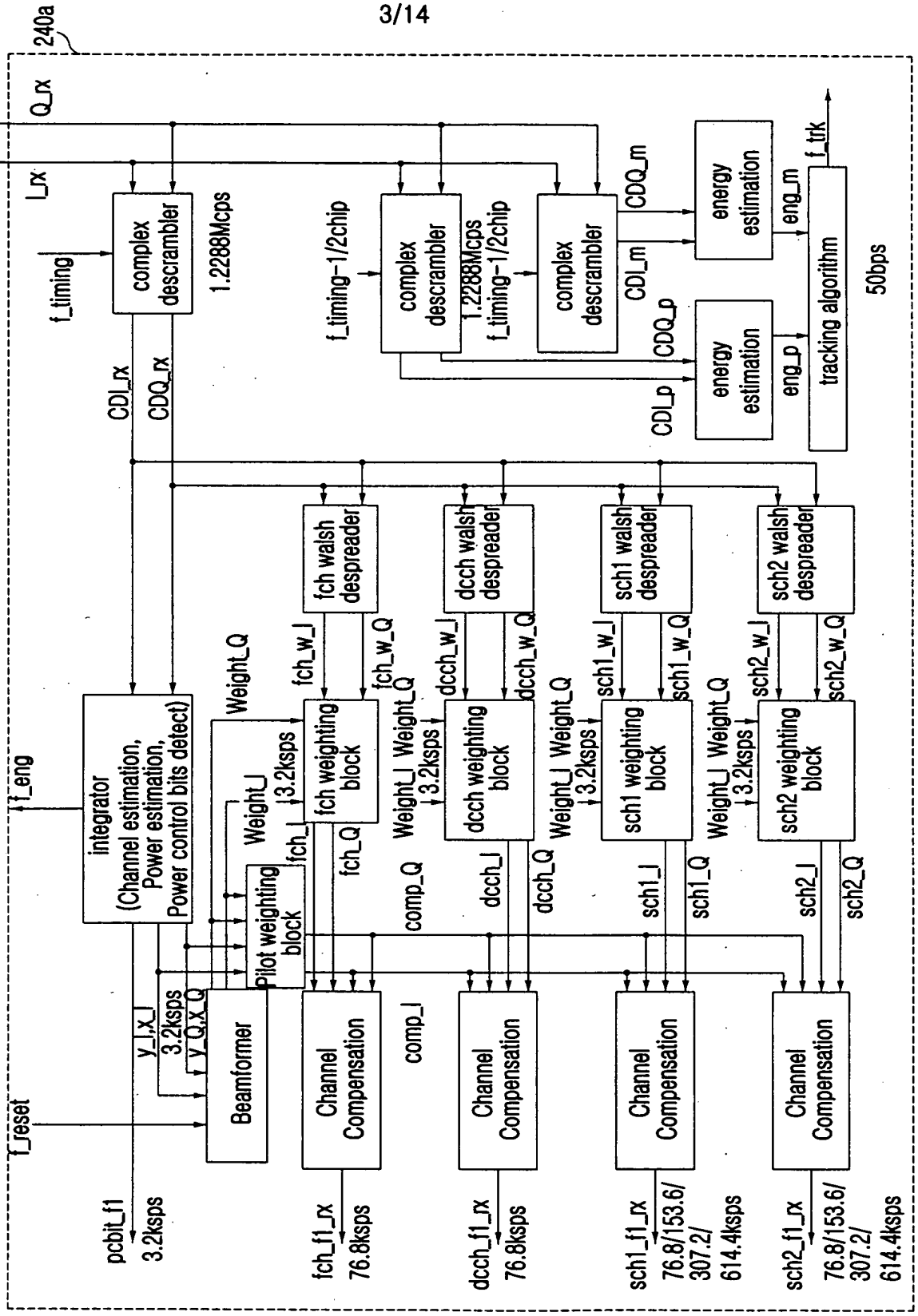

240a
Q_rx
I_rx
f_timing
complex descrambler
1.2288Mcps
f_timing-1/2chip
complex descrambler
1.2288Mcps
f_timing-1/2chip
complex descrambler
CDQ_m
CDI_m
energy estimation
eng_m
f_trk
CDI_rx
CDQ_rx
CDQ_p
CDI_p
energy estimation
eng_p
tracking algorithm
50bps
f_eng
integrator (Channel estimation, Power estimation, Power control bits detect)
Weight_Q
Weight_I
Pilot weighting block
fch walsh despreader
fch weighting block
fch_w_I
fch_w_Q
fch_I
fch_Q
dcch walsh despreader
dcch weighting block
dcch_w_I
dcch_w_Q
dcch_I
dcch_Q
sch1 walsh despreader
sch1 weighting block
sch1_w_I
sch1_w_Q
sch1_I
sch1_Q
sch2 walsh despreader
sch2 weighting block
sch2_w_I
sch2_w_Q
sch2_I
sch2_Q
3.2ksps
comp_Q
comp_I
y_I, y_Q
3.2ksps
Beamformer
Channel Compensation
f_reset
pcbit_f1
3.2ksps
fch_f1_rx
76.8ksps
dcch_f1_rx
76.8ksps
sch1_f1_rx
76.8/153.6/ 307.2/ 614.4ksps
sch2_f1_rx
76.8/153.6/ 307.2/ 614.4ksps

FIG. 2C

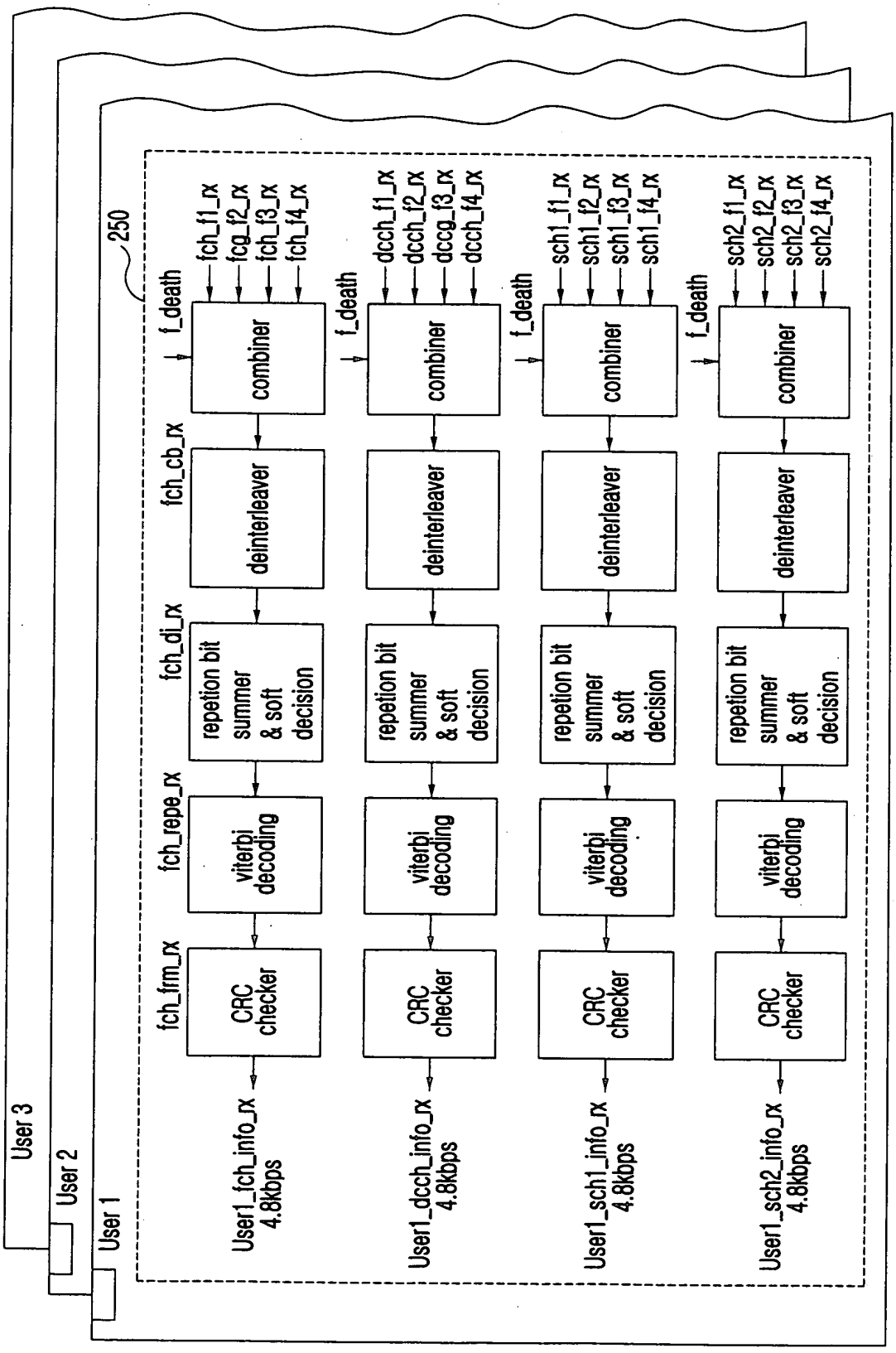

User 3
User 2
User 1
250
fch_f1_rx
fcg_f2_rx
fch_f3_rx
fch_f4_rx
f_death
combiner
fch_cb_rx
deinterleaver
fch_di_rx
repetion bit summer & soft decision
fch_repe_rx
viterbi decoding
fch_frm_rx
CRC checker
User1_fch_info_rx 4.8kbps
dcch_f1_rx
dcch_f2_rx
dccg_f3_rx
dcch_f4_rx
User1_dcch_info_rx 4.8kbps
sch1_f1_rx
sch1_f2_rx
sch1_f3_rx
sch1_f4_rx
User1_sch1_info_rx 4.8kbps
sch2_f1_rx
sch2_f2_rx
sch2_f3_rx
sch2_f4_rx
User1_sch2_info_rx 4.8kbps

FIG. 3

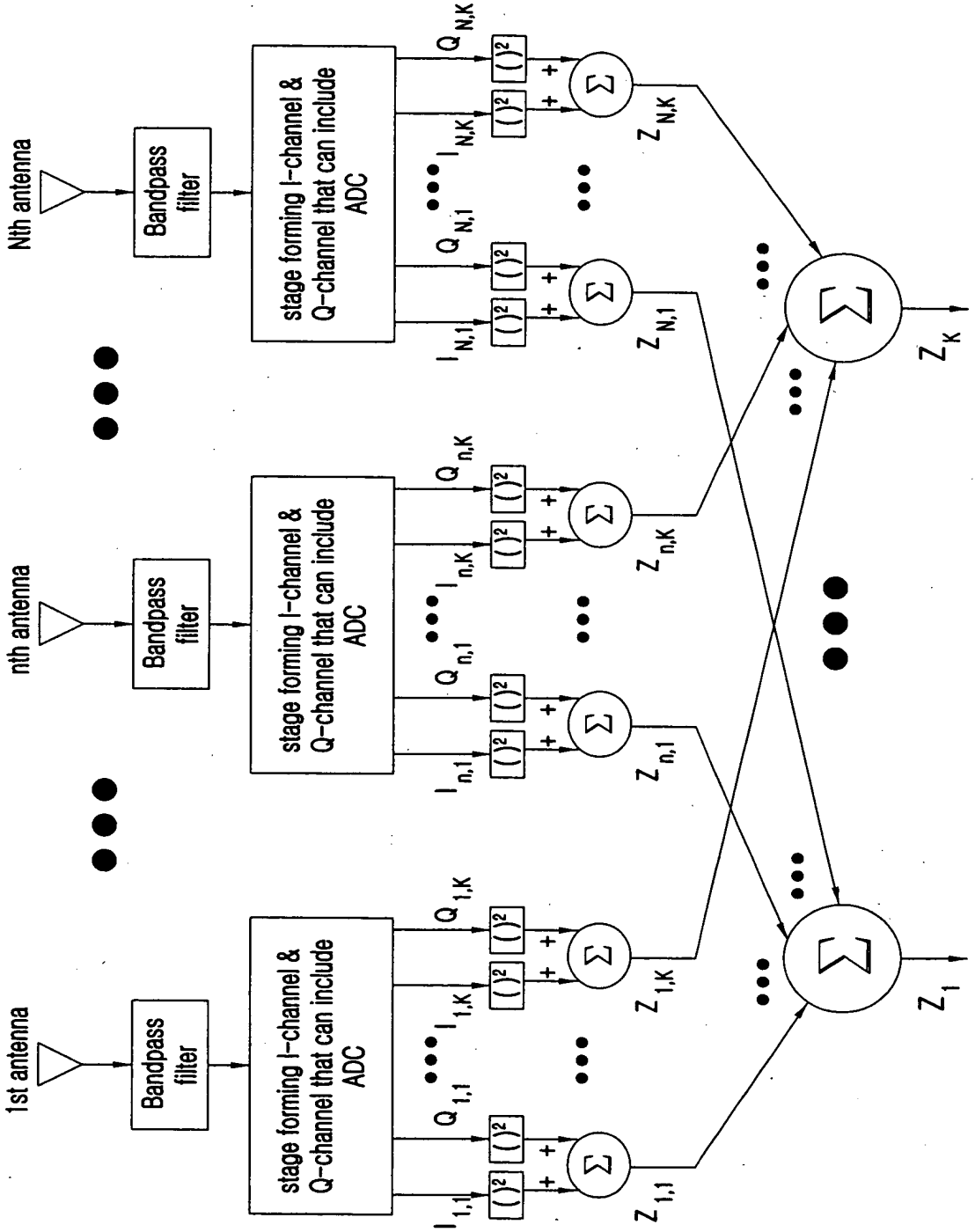

1st antenna
Bandpass filter
stage forming I-channel & Q-channel that can include ADC
nth antenna
Bandpass filter
stage forming I-channel & Q-channel that can include ADC
Nth antenna
Bandpass filter
stage forming I-channel & Q-channel that can include ADC
Σ
Z1
ZK

FIG. 4

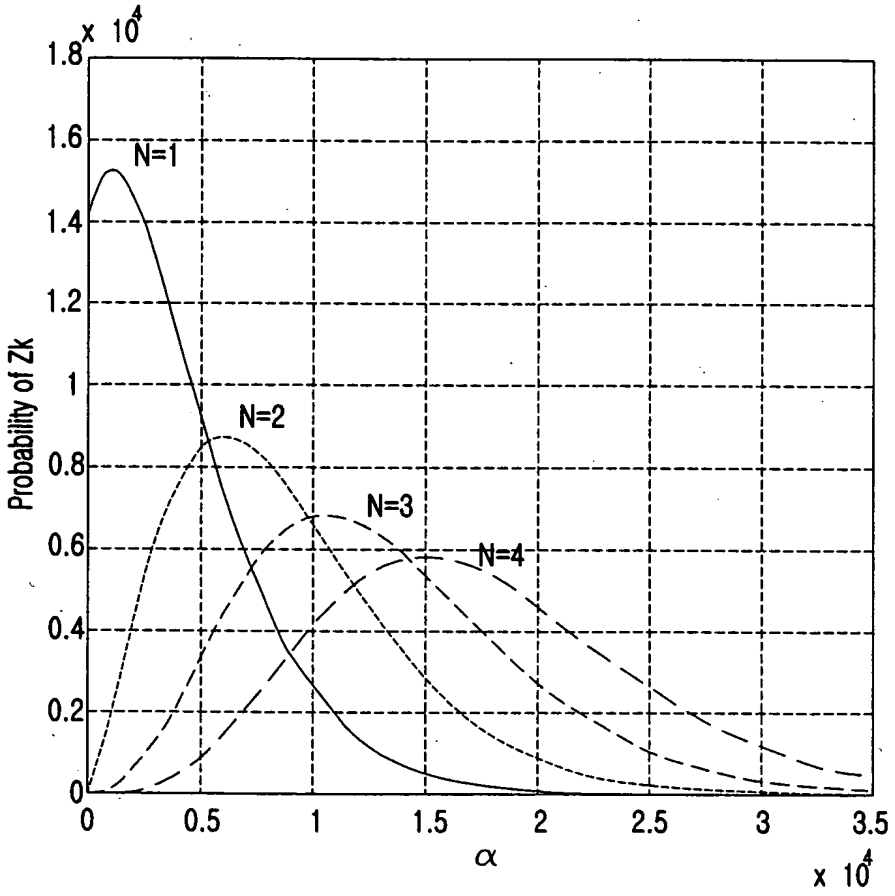

x 10^4
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Probability of Zk
N=1
N=2
N=3
N=4
0
0.5
1
1.5
2
2.5
3
3.5
α
x 10^4

FIG. 5

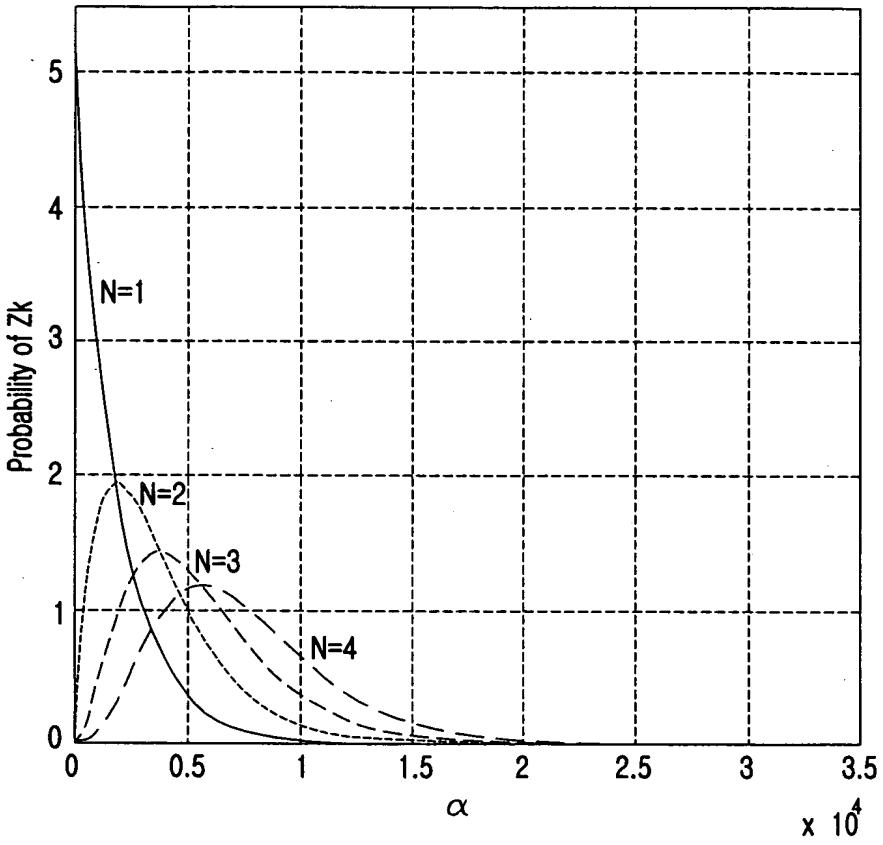


FIG. 6

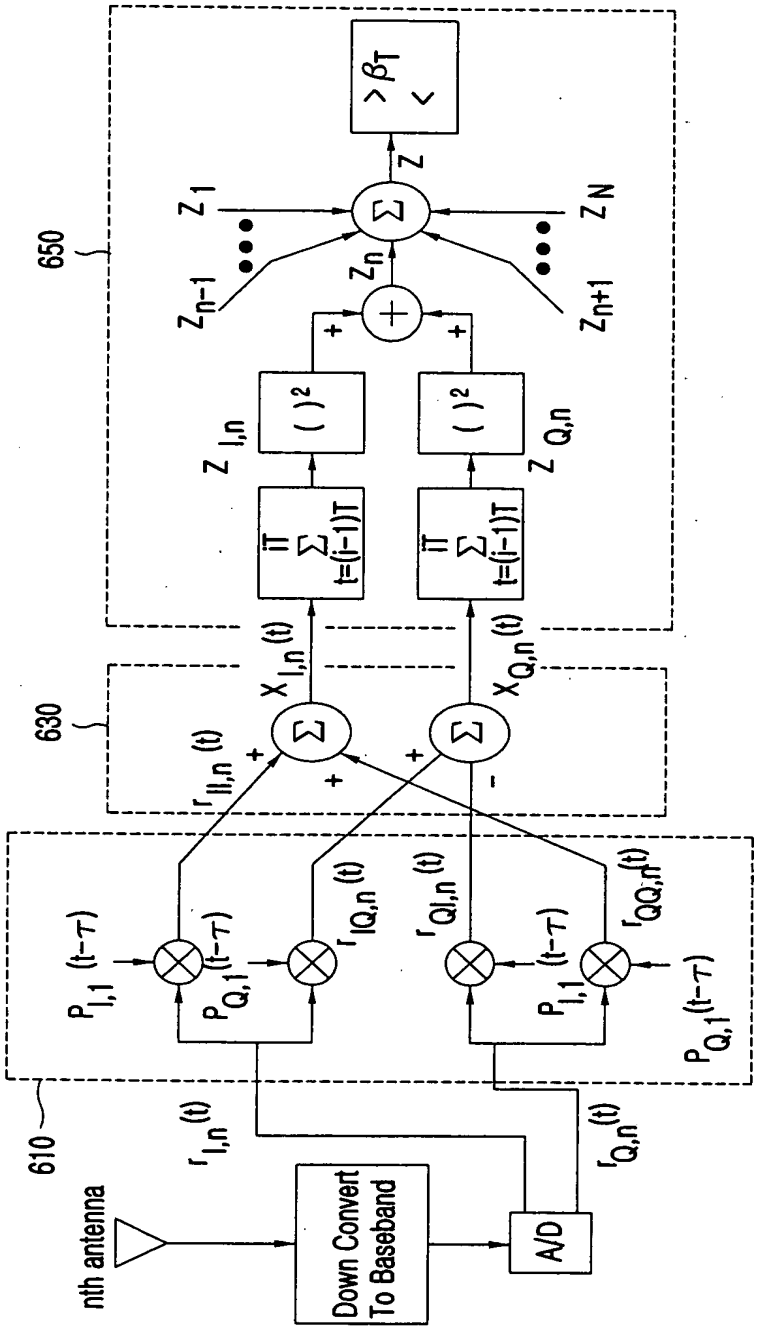

610
nth antenna
Down Convert To Baseband
A/D
$r_{I,n}(t)$
$r_{Q,n}(t)$
$P_{I,1}(t-\tau)$
$P_{Q,1}(t-\tau)$
$r_{II,n}(t)$
$r_{IQ,n}(t)$
$r_{QI,n}(t)$
$r_{QQ,n}(t)$
630
$X_{I,n}(t)$
$X_{Q,n}(t)$
650
$\int_{t=(i-1)T}^{iT}$
$Z_{I,n}$
$Z_{Q,n}$
$( )^2$
Z_{n-1}
Z_n
Z_{n+1}
Z_1
Z_N
Z
$> \beta_T <$

FIG. 7

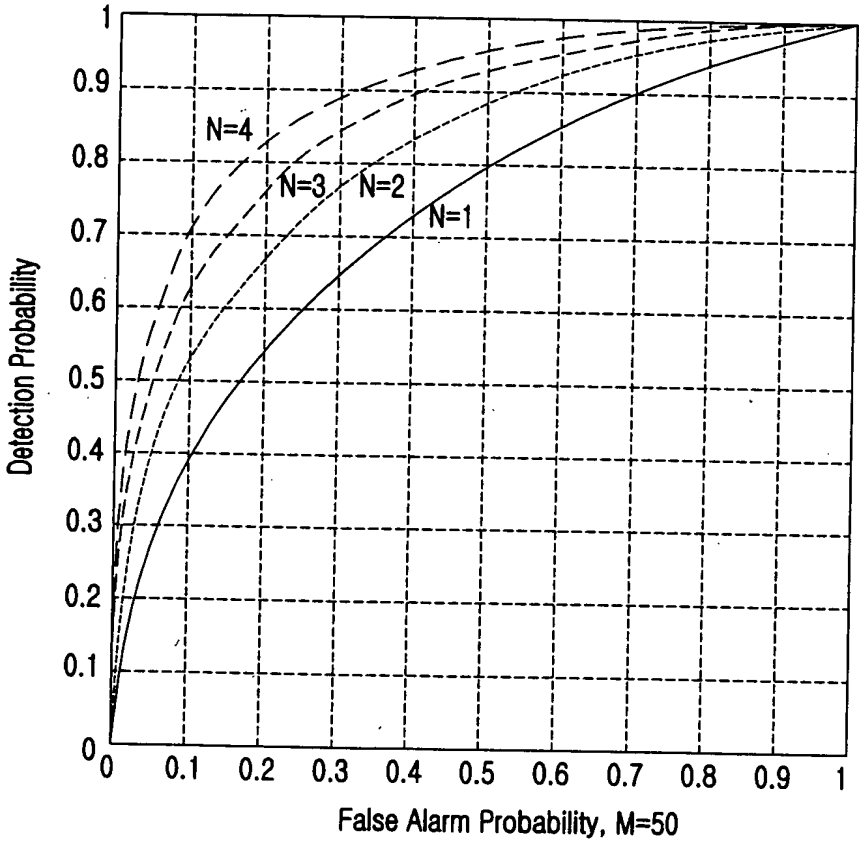

Detection Probability
False Alarm Probability, M=50
N=4
N=3
N=2
N=1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

FIG. 8

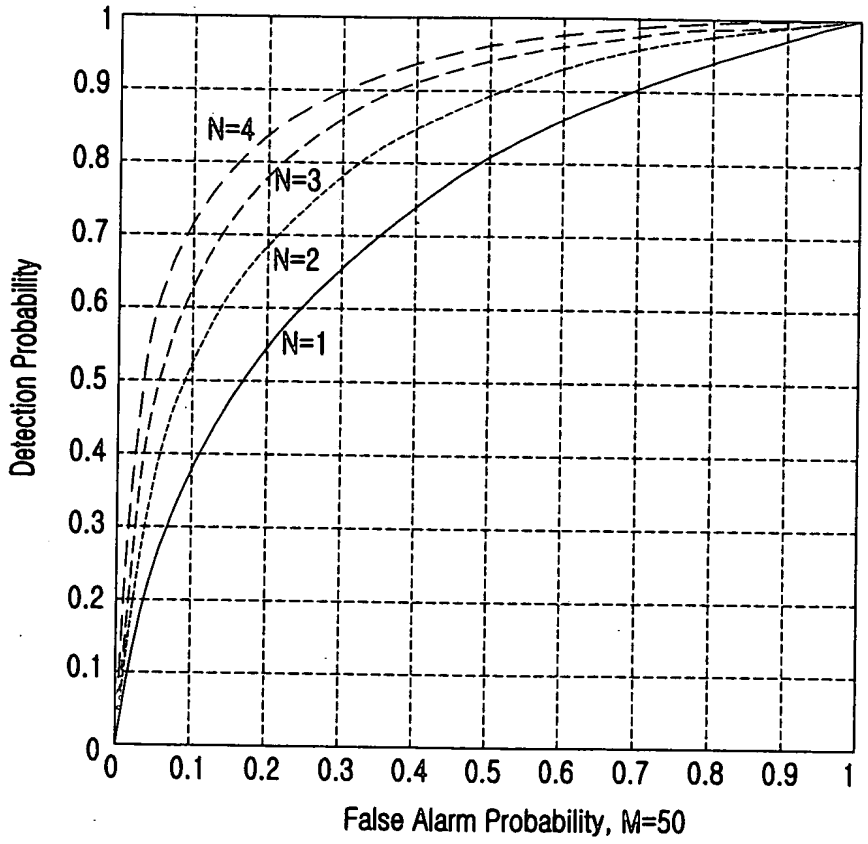

Detection Probability
False Alarm Probability, M=50
N=4
N=3
N=2
N=1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

FIG. 9

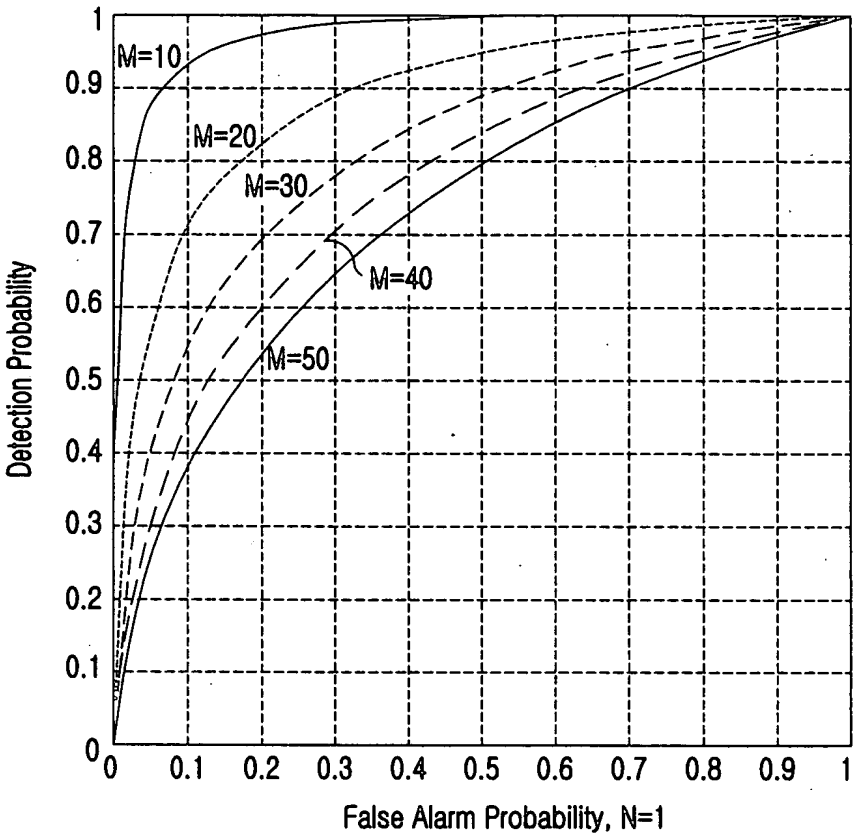

M=10
M=20
M=30
M=40
M=50
Detection Probability
False Alarm Probability, N=1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

FIG. 10

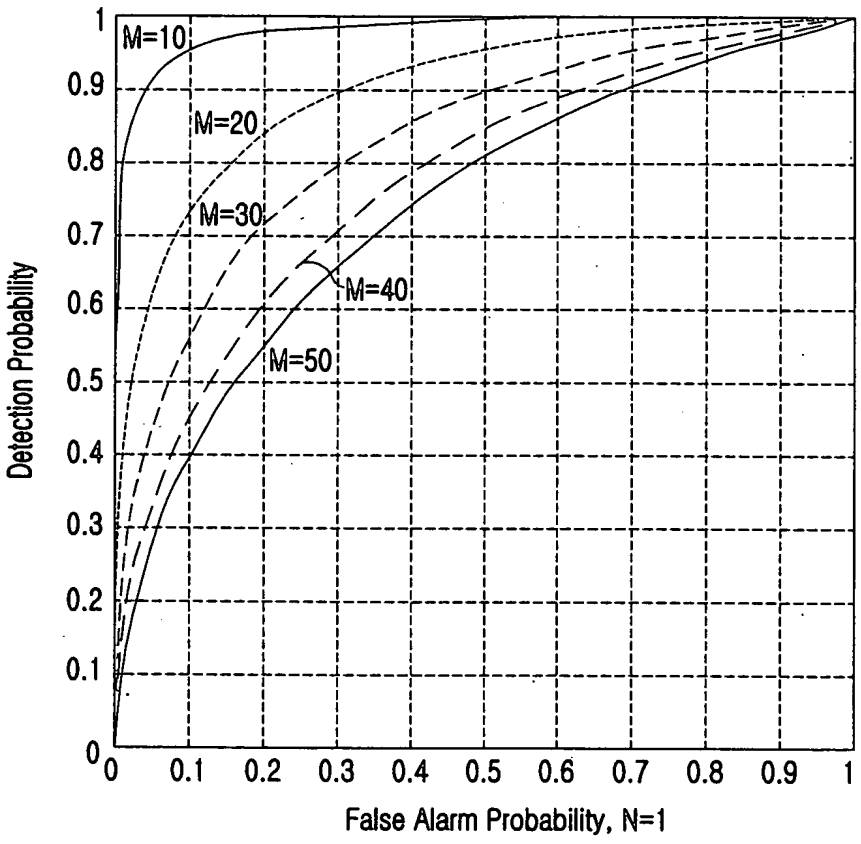

M=10
M=20
M=30
M=40
M=50
Detection Probability
False Alarm Probability, N=1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

FIG. 11

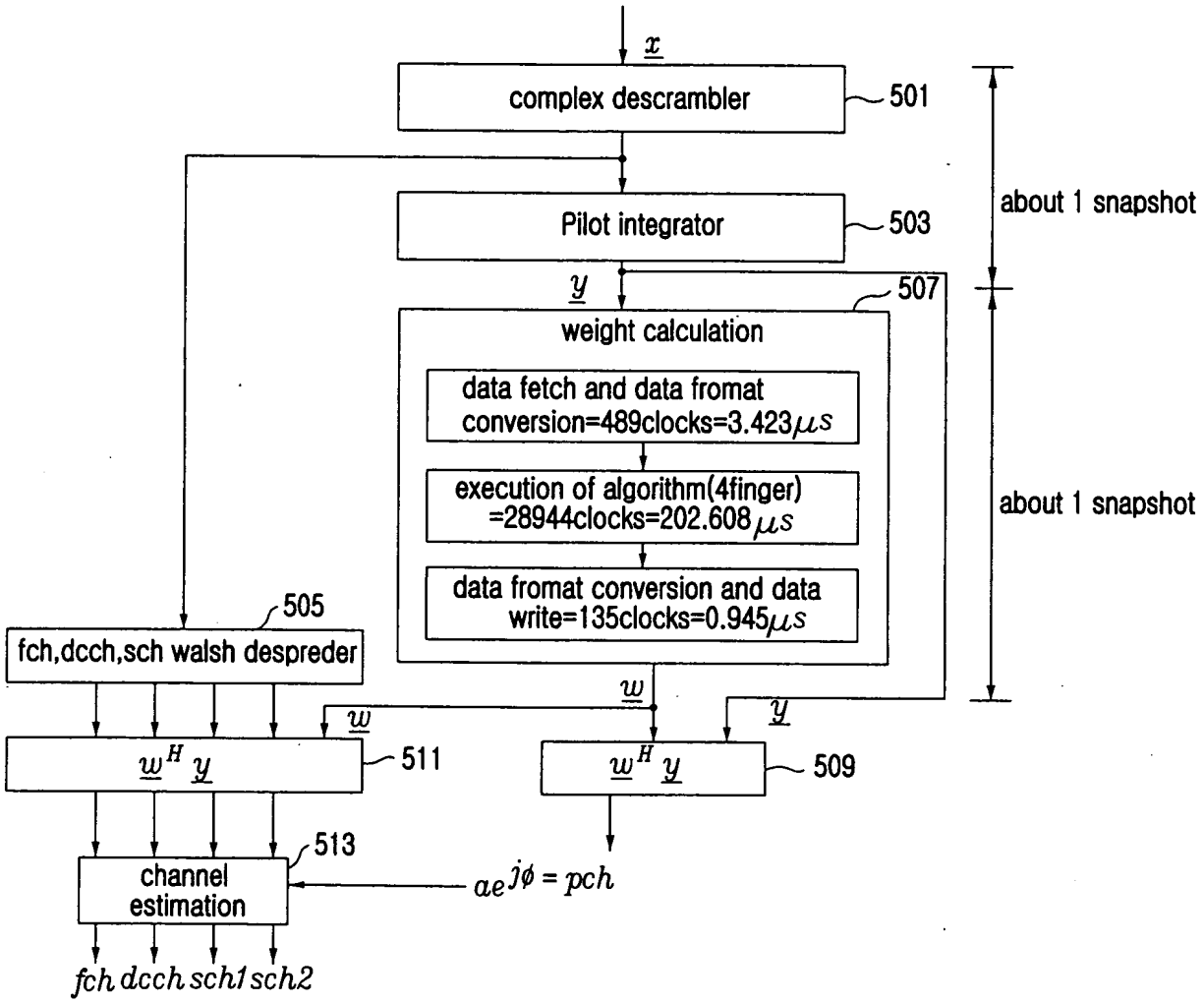
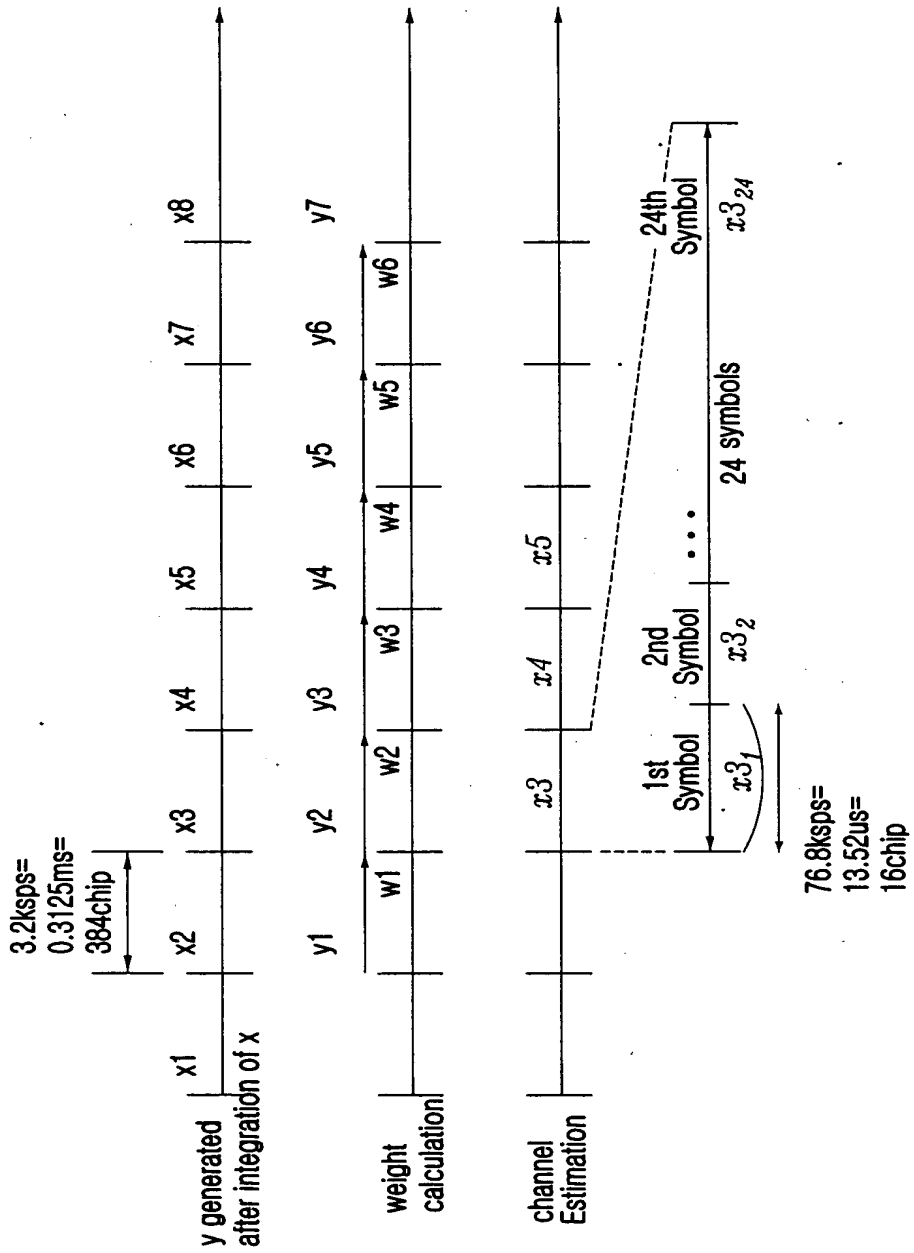

x
complex descrambler
501
Pilot integrator
503
about 1 snapshot
y
507
weight calculation
data fetch and data fromat conversion=489clocks=3.423μs
execution of algorithm(4finger) =28944clocks=202.608μs
data fromat conversion and data write=135clocks=0.945μs
about 1 snapshot
505
fch,dcch,sch walsh despreder
w
y
w
w^H y
511
w^H y
509
513
channel estimation
ae^jφ = pch
fch dcch sch1 sch2

FIG. 12


3.2ksps=
0.3125ms=
384chip
x1
x2
x3
x4
x5
x6
x7
x8
y generated
after integration of x
y1
y2
y3
y4
y5
y6
y7
w1
w2
w3
w4
w5
w6
weight
calculation
x3
x4
x5
channel
Estimation
1st
Symbol
2nd
Symbol
24th
Symbol
24 symbols
76.8ksps=
13.52us=
16chip